CALL NO. 08-1
FOR PROFESSIONAL SERVICES
TO BE PROVIDED TO THE
CITY OF SANTA CLARA, CALIFORNIA
BY BEW ENGINEERING

The Parties to this Call No. 08-1 ("Call") agree that on this _____ day of _____, 2008, this Call is made pursuant to the terms of a Call Agreement between the Parties entitled, "Call Agreement by and Between the City of Santa Clara, California and BEW Engineering," dated July 10, 2007, which was assigned to BEW Engineering by Davis Power Consultants on August 13, 2008, the terms of which are incorporated by this reference. This Call describes the Services to be provided to the City of Santa Clara, California ("City") by BEW Engineering ("Contractor"), which are more fully described in Contractor's proposal to City entitled "Proposal for 2008-2009 to Provide Consulting Support Services" dated June 30, 2008 ("Proposal"), attached to this Call as Exhibit A and incorporated by this reference. The Services to be performed under this Call shall be completed within the time period beginning on August 26, 2008, and ending on June 30, 2009. The attached Proposal contains a complete description of the Services, and performance dates for the completion of such Services, to be performed by the Contractor under this Call. In no event shall the amount paid to the Contractor for the Services provided to City by the Contractor under this Call, including all fees or pre-approved costs and/or expenses, exceed one hundred twenty five thousand dollars ($125,000.00), subject to budgetary appropriations.

The Parties acknowledge and accept the terms and conditions of this Call as evidenced by the following signatures of their duly authorized representatives.

CITY OF SANTA CLARA, CALIFORNIA,
a chartered California municipal corporation

Approved as to Form:

_____
HELENE L. LEICHTER
City Attorney

Attest:

_____
ROD DIRIDON, JR.
City Clerk

By: _____
JENNIFER SPARACINO
City Manager

1500 Warburton Avenue
Santa Clara, CA 95050
Telephone: (408) 615-2210
Fax: (408) 241-6771

BEW ENGINEERING
a California corporation

By: _____
BILL ERDMAN
Title: President
Address: 2303 Camino Ramon, Suite 220
San Ramon, CA 94583
Telephone: (925) 867-3330

PROPOSAL

For a

2008-2009 Agreement to provide Consulting Support Services

To:
Silicon Valley Power™ of the
City of Santa Clara
Santa Clara, California

June 30, 2008

Prepared By:
BEW Engineering
2303 Camino Ramon
Suite 220
San Ramon, CA 94583
Phone: (925) 867-3330

Proposal for a 2008-2009 Agreement to Provide Consulting Support Services to Silicon Valley Power™ of the City of Santa Clara

1 INTRODUCTION

BEW Engineering (BEW) is pleased to submit this proposal for an Agreement between BEW and Silicon Valley Power (SVP) of the City of Santa Clara (Santa Clara) to provide consulting support services. The Agreement covers the period from July 1, 2008 through June 30, 2009.

On July 14, 2008, BEW acquired Davis Power Consultants (DPC). DPC has been a SVP consultant since 1989 and has an existing Call Agreement. SVP will assign the existing DPC Call Agreement to BEW. Ron Davis will continue providing consulting services and be the project manager.

2 WORK PLAN

BEW proposes to assist Santa Clara during Fiscal Year 2008-2009 in the following areas:

1. Transmission Planning and Analytical Support
2. Western Area Power Administration Support
3. General Resource Analysis and Planning
4. SVP Existing Contract Support
5. MRTU Issues
6. Resource Adequacy
7. Other Duties as Assigned

Subject Area 1: Transmission Planning and Analytical Support

From time to time, transmission studies are conducted to evaluate the import capability of the interconnected system and the associated impacts as additional off-system power is purchased. Ron Davis works closely with PG&E, CAISO, CEC and other agencies to develop a transmission power flow model that reflects system conditions for various seasons of selected years.

As SVP evaluates control area options, SVP must evaluate the response of both the generating resources and the transmission system to reliably serve customer load. BEW can assist the transmission/distribution department as needed. BEW maintains and updates the transmission power flow model that is the PowerWorld Simulator. It is important for SVP to have a thorough understanding of the capability of the interconnected system to import additional power. BEW has a license to General Electric PSLF and PSEE models and conducts load flow and transient analysis using these models.

The transmission evaluation serves several purposes. The first is the integration of transmission, resource planning and load forecasting into one study. By knowing the limitations of the existing system and the expansion options for increasing import capability, the operating study evaluates resource options that include transmission expansion, internal resource expansion and out-of-state opportunities.

BEW believes that it is important to have an internal study completed that evaluates transmission opportunities and the associated value to SVP. BEW proposes to use the Strategic Value Analysis (SVA) that Ron Davis developed through the CEC PIER. The methodology can evaluate resource opportunities on the value to reducing congestion and improving reliability. Although developed through PIER, BEW can use the methodology for studies outside of the CEC. The methodology has also been used in the CEC Intermittency Analysis Project (IAP) and the current PG&E northern California Regional Integration of Renewables (RIR). The methodology will also be used in a Combined Heat and Power Study with Lawrence Livermore National Labs.

BEW staff can provide preliminary power flow training to the resource department. This enables resources to undertake internal studies.

Subject Area 2: Western Area Power Administration Support

The operation of the Western hydro system continues to have problems and issues for the Western customers. Continual monitoring of the Western operations is required to ensure that the customers are receiving the maximum benefits for its investments. BEW has supported SVP during meetings and conducting economic studies to determine strategies for negotiating with Western. BEW can continue to provide such service during the next fiscal year.

Subject Area 3: General Resource Analysis and Planning

During the fiscal year, BEW can assist SVP in the release of a multi-year operating planning study. BEW works with other SVP departments to develop the input data assumptions, such as maintenance schedules, hydro generation projections, natural gas price forecasts, spot energy price forecasts, transmission ratings, geothermal generation projections, and general inflation rates. These projections and forecasts are input into a power simulation model used by SVP. BEW assists in developing the study scenarios, reviewing output results, and creating the final report. The data base is updated as significant changes occur on the system or when specific studies are needed.

An initial operating study analyzes the system in detail to determine the strengths and weaknesses of the electric resource system. Sensitivity analysis is conducted to determine the response of the system to changes such as load uncertainty, gas and market energy prices, hydroelectric conditions and resource availability. The results of an initial study are used as the base for comparing the operation of the system under different scenarios. The output results project capacity and energy shortfalls that can be used as a basis for securing short and long term power purchases.

The California legislature passed several bills that require investor-owned utilities (IOU) to have 20 percent of its customer load served by renewable technologies by 2010. The new target is 33% of its customer load served by renewables by 2020. There is discussion to increase the target to 40% by 2025. BEW may be involved in conducting studies for the CEC on the issues with increasing the target to 40%. Although not directly required by state law, Santa Clara made a commitment to meet or exceed the renewable standards. The policy statement is called the "Environmental Stewardship and Renewable Portfolio Standard Policy Statement."

SVP contracted wind renewable resources outside of California. Questions remain regarding the contribution of out-of-state renewables in meeting the penetration targets. This is due to the lack of a WECC REC accounting system which is still being developed. SVP is also investigating the repowering of Altamont Pass for wind generation. A detailed study could be completed on the operational impacts of scheduling and dispatching wind.

There may be opportunities for base load geothermal power. BEW can assist SVP in investigating such opportunities and the potential for firm base load at economical prices. There are geothermal potential in Oregon and Nevada that could provide firm, base load power.

SVP may be indirectly required to install solar PV on its system as part of the state mandated residential programs. SVP may need to conduct studies on the economics of such development within SVP service area and what other options may be available to substitute for residential PV. BEW can assist in this analysis.

New state laws require that California utilities reduce carbon emissions to 1990 levels by 2020. This may require that SVP purchase other types of resources that reduce the carbon emissions from existing resources. There are discussions at the California legislature to further reduce the carbon emissions to below the 1990 level and to reduce the time period to 2015 or 2017.

BEW can work with SVP staff on an integrated resource planning study. This study considers the impacts of transmission, distribution, load forecasting, power purchases and new generation on the continued reliability of the system to provide reliable and economic power to SVP customers. As part of this study, BEW works with SVP staff on the potential CAISO costs under different control area configurations and 230 kV development. An integral part of this study is the penetration of demand-side management and customer self generation. The penetration of these resources on the distribution system can alter the generating resource requirements of SVP.

Subject Area 4 SVP Existing Contract Support

SVP may need to review the operating flexibility of its existing resources to meet ancillary service requirements of the CAISO and the control area operator. SVP must determine if its existing resources and future alternatives can self-provide spinning reserves, regulation and voltage support as required by the CAISO or control area operator or if the operation of the existing resources need to be changed. BEW can support staff in these studies.

Subject Area 5 MRTU Issues

Although SVP is currently in the CAISO control area, there may be other options available. SVP could pursue joining the Western/SMUD sub-control area or form its own control area. SVP may also have opportunities of becoming a SC and SA for other smaller utilities in California as

well as integration opportunities with utilities in other control areas within California. SVP needs a thorough understanding on the economic benefits of participating in other control areas or forming its own control area. If SVP desires to expand its services to other utilities, it needs a good understanding on the costs and benefits of such ventures.

If SVP expands its transmission interconnections in California through the construction of new transmission lines, SVP must include an evaluation as to the control area impacts and associated costs. BEW can provide the analytical support needed to evaluate these alternatives.

Subject Area 6 Resource Adequacy

This task is associated with long term studies on the configuration of the future resource (generating) system and the associated transmission interconnected system. The resource planning tasks investigate potential short-term operational issues such as resource adequacy, local capacity requirements, ancillary services and planning reserves. The long-term tasks investigates issues such as the import capability of the transmission system for delivering off-system resources and the timing and quantity of new power resources to serve SVP load. The bulk of the transmission analysis is limited to the 115 kV and above system. Other major subtasks focus on Western power availability, resource adequacy, renewable energy development and the value of the existing hydroelectric resources.

BEW is available to work with SVP staff to develop a standard resource adequacy policy for hydro generators and other renewable resource technologies. The CAISO, CPUC, WECC are developing policies. BEW can evaluate these different policies and develop a standard that is best for Santa Clara customers. Ron Davis had developed a projection of resource adequacy based on the use of SVP historical load to develop monthly capacity ratings. The study could be expanded to evaluate all methodologies in order to determine which methodology provides the most capacity benefit to SVP while maintaining SVP's high standard for Resource Adequacy and the subsequent high standard of reliability.

Local capacity requirements are becoming a major concern. SVP could be required to locate and maintain a pre-determined percentage of its resources within the service area or within the PG&E Greater Bay Area. This appropriate percentage to be used by SVP must be determined and a methodology developed if this percentage is different than the state policy for IOUs. SVP has

other resources located in other congestion areas of the ISO. SVP can participate in the allocation of resources into these other congested regions and receive payments for its contributions. A detailed study may need to be completed to determine the optimal use of these resources.

Subject Area 7 Other Duties as Assigned

BEW stands ready to fully support SVP on other projects as assigned. BEW continues to meet the needs of SVP as new requirements are imposed on SVP.

3 PROJECT MANAGEMENT PLAN

Ron Davis manages the project tasks. In addition to Davis's extensive overall involvement in the project, he is directly responsible for: (1) managing schedules and budgets; (2) project and staff planning; (3) technical oversight; and (4) reporting project outcomes.

4 SCHEDULE

BEW proposes to commence work on any tasks when authorized by Santa Clara. The agreement lasts until terminated by either party or June 30, 2009, whichever occurs first. As SVP assigns specific tasks, BEW continues to consult with SVP on scheduling and completion dates.

5 COSTS

BEW proposes providing its consulting support services, calculated on hourly rates, for a projected not-to-exceed cost of $125,000 for consulting services and direct costs to complete a selected number of tasks from this proposal. BEW and SVP staff will mutually agree to the tasks that are to be completed under the proposed budget.

BEW staff hourly rates shown below are for standard consulting services; testimony services are provided at different rates, if needed. Direct costs are billed to SVP, as accrued, without any handling fees.

TITLE	HOURLY RATE
Ron Davis	$185.00
Mike Behnke	$185.00
Billy Quach	$150.00
Neelofar Anjum	$150.00

6 QUALIFICATIONS AND EXPERIENCE

6.1 Overview of BEW

Legal Name

Behnke, Erdman & Whitaker Engineering, Inc.,
DBA "BEW Engineering, Inc."

Established

September 10, 2003
State of California Corporation #2552889

Corporate Address

2303 Camino Ramon, Suite 220
San Ramon, California 94583
Phone 925.867.3330
Fax 925.867.3331
www.bewengineering.com

Principals and Officers

William L. Erdman, President
Charles M. Whitaker, Principal Engineer & Secretary/Treasurer
Michael R. Behnke, Principal Engineer
Raymond M. Hudson, Principal Engineer

Team

The BEW Engineering team is made up of 14 engineers and technical support people with a combined experience in distributed generation of over 200 years. We have adjunct specialty support on a regular basis from long-standing colleagues in related areas that can be called upon as needed.

Overview

BEW Engineering, Inc. was formed to provide engineering consulting services and to perform research and development in electrical power systems for bulk power and distributed energy resource applications. Our expertise in distributed generation, renewable energy systems (primarily wind and PV), and power electronics affords us direct involvement with large-scale transmission-level projects and distributed energy resources for utility-connected and remote stand-alone applications.

Key Clients

Acciona Energia, AES, Bay Area Rapid Transit District, British Petroleum, California Energy Commission, California Wind Energy Collaborative, Canadian Standards Association, Clipper Windpower, Distributed Utility Associates, GE Energy, Global Energy Concepts, Greenvolts, Horizon Wind Energy, HSH Nordbank, KEMA, MMA Renewable Ventures, Morgan Stanley, MP2 Capital, National Renewable Energy Laboratory, OptiSolar, PacifiCorp, PowerLight, Sacramento Municipal Utility District, Sandia National Laboratories, Siemens,

Spire Solar, SunEdison, SunPower, UPC Solar Management, Xantrex Technology.

6.1.2 BEW Expertise and Background

Primary Business Activities

- Technical consulting in the area of electrical power systems for technology developers in the distributed generation industries (emphasis on wind power). Includes Transmission & Distribution integration studies.
- Consulting in the area of wind power. The company emphasizes traditional electrical engineering disciplines including rotating machines, transmission planning, and collection system design. Additionally, the company has unique experience and capabilities in power electronics, drivetrain development, electronic pitch systems, turbine control algorithm development, and intellectual property development. The company is recognized as a leader in these fields with a history dating back to some of the earliest variable speed turbines.
- Consulting in the area of solar power. A major focus for BEW has been in the areas of solar PV systems and components. Emphasis has been on: PV system engineering and review, PV system electrical design, technical report writing, PV system test and evaluation, and codes and standards development.
- Research and development in the area of power electronics for distribution generation and utilization applications. Includes testing, IP Development, design review and input for new products.

Recent Projects

Performance of transient stability studies for approximately 3,000 MW of wind projects throughout the western US for various utility clients.

Performance of transmission feasibility studies for various wind and solar project developers.

Development of positive sequence dynamic models (PSS/E and PSLF) for wind and solar PV power plants for numerous project and technology developers.

Design of reactive power compensations systems for wind plants.

Design of medium and high voltage power collection systems for large scale solar PV power plants.

WindPACT Study for the National Renewable Energy Laboratory and the US Department of Energy.

Intermittency Analysis Project for the CEC. Focus is on wind and transmission related results.

Conceptual design and cost optimization of large scale solar photovoltaic plant. Results will influence specifications of solar photovoltaic module that the client

is developing for a particular application.

Re-design of peak power tracking algorithm for improved energy yield for a client's photovoltaic inverter product line.

Testing and evaluation of PV module and inverter performance to validate energy model for 10 MW photovoltaic power plant in Germany.

Conceptual design study and cost of energy evaluation for a new power conversion concept for multi-megawatt wind turbines.

Developed load flow and dynamic models of a new utility-scale wind turbine for use in transmission system impact studies conducted using the PTI PSS/E and GE PSLF analysis packages.

Conceptual design, cost study, detailed design and testing of electrical drive train components for new wind turbine gearbox, generator and converter concept.

Led development of technical requirements for California Public Utilities Commission Rule 21, which governs distributed generation interconnection requirements for investor owned utilities in California.

Conducted field verifications of newly developed photovoltaic technologies to assess performance capabilities in full-scale field or commercial settings.

Support for the CEC's Distributed Utility Integration Testing.

Performed transmission interconnection feasibility and system impact studies for utility scale wind plants in Iowa and New York.

BEW has represented financiers as a 3rd-party Independent Engineer in over 100 PV system installations with a combined capacity of 100 MW. System sizes have ranged from 70 kW to 14 MW. Tasks have included site assessments, design reviews for code compliance, detailed energy predictions, probability analyses of energy forecasts, contract and warranty reviews, construction schedule review, risk assessment, system acceptance, inspections, and commissioning assistance, and operations and maintenance cost assessment.

6.2 Overview of the Former DPC

Since 1990, Ron Davis has provided the electric utility industry with customized services and support at competitive rates. Our services range from providing supplemental manpower during critical time periods to full in-depth consulting and testimony. Ron provides expert services in:

- Operations and Resource Planning
- Power Purchase Analysis
- Reliability and Risk Assessment

- Integrated Resource Planning
- DSM Integration and Implementation
- Fuel Planning and Budgeting
- Contract Bidding Preparation and Evaluation
- Economy Energy Interchange and Forecasting
- Software Evaluation and Training
- Transmission Planning/Access
- Hydro/Thermal Integration
- Financial Planning
- Cost Benefit Analysis of Hydro Projects.

6.2.1 Significant DPC Projects

Over the past two years, DPC has had an Energy Commission contract to develop a methodology to find strategic locations for renewable technology development that could provide transmission reliability improvements while providing new renewable power to California. DPC has been a participant in the 2005 CEC Integrated Energy Policy Report and has presented material at several CEC workshops. DPC has been an invited speaker at several wind conferences in the United States. During phase 2 of the project, DPC will be expanding the renewable technology analysis by including production costing, more transmission load flow time periods and out-of-state developers.

DPC is currently under contract with the CEC to be a participant on a state-wide intermittency study to investigate the potential reliability impacts of installing large concentrations of intermittent resources (wind and solar) on the system. DPC is also a participant in the wind collaborative and the geothermal collaborative.

DPC has performed power purchase RFP bidding and evaluation for the City of Santa Clara, San Diego Gas & Electric, M-S-R Power Agency, and Northern California Power Agency. We supported Southern California Edison (SCE) with its 1992 ECAC filing with the CPUC, and during 1993, assisted SCE in developing and modeling economy energy forecasts for the Pacific Northwest and Pacific Southwest.

For the Sacramento Municipal Utility District (SMUD), DPC has developed a dynamic cost-benefit analysis for evaluating pumped storage and run-of-river hydro projects. DPC has provided support to the Western Area Power Administration as part of a Central Valley Project

(CVP) task force, which was organized to support Western during PG&E negotiations and to determine long-range resource power needs.

For the City of Shasta Lake, DPC has actively supported its becoming a real-time scheduling customer; negotiated contracts for its scheduling agents and control area services; and conducted short-term and long-term planning. We continue to develop Shasta Lake's annual operating plan, determine the timing of purchase power RFP releases, review RFP responses, select the best alternative, develop monthly operating plans, review and approve daily pre-scheduling, and verify end-of-month billing.

DPC, active in power marketing for several years, has also solicited and negotiated power purchases and sale contracts between municipals, IOUs and power brokers/marketers, including short-term firm, power exchanges and transmission wheeling.

DPC major clients include:

- City of Santa Clara
- City of Shasta Lake
- City of Palo Alto
- Clauder Systems Research
- EBASCO Services
- ERG International, Inc.
- Sacramento Municipal Utility District
- San Diego Gas & Electric
- Sierra Energy and Risk Assessment
- Southern California Edison
- Unified Information

6.2.2 SVP and DPC Experience

DPC has provided consulting support services to SVP for more than fifteen years.

Davis has assisted SVP in developing its annual power marketing strategies (Short-term Business Plans) from 1993 to present. They included recommendations on marketing power resources and excess transmission capacity. Davis has assisted in negotiating power purchase contracts, transmission access, and hydro thermal coordination, as well as providing services and training in power marketing, pricing philosophy, and scheduling to SVP.

Davis was a member of the review team that evaluated the responses to the power-supply alliance RFP. The team selected the short-list, participated in the interviews, and negotiated the final agreements. Davis continues to assist SVP in developing the projects to be undertaken by

the power-supply alliance.

Davis served as technical consultant to review the power plant valuing study completed by Theodore Barry and Associates (TBA), meeting with TBA staff to review the spreadsheets and input data assumptions used in the study. Finally, Davis continues to work with SVP and with other consultants, such as Harrison Call and RMI.

DPC prepared an internal merchant power plant feasibility study that evaluated the potential and economic benefits of in-area power plant development. DPC then prepared a list of requirements for power plant development and a list of potential developers. Each of the candidates was invited to visit the sites and prepare offers. DPC continues to investigate other merchant power plant developments in the region and their benefits to SVP.

DPC was the first consultant to work with SVP in developing a transmission load flow study of the PG&E San Jose 115 kV transmission network. DPC assisted SVP in the purchase of an interactive load flow program that is capable of demonstrating potential problems on the system that could adversely impact SVP's ability to provide reliable power to its customers. DPC has met with both the California Energy Commission and the California Public Utility Commission on transmission issues.

DPC has been an integral part of the Western power contract negotiations and attended meetings on behalf of SVP. DPC has been working with and representing SVP for fifteen years at Western meetings and negotiations. DPC has been involved in the past on the negotiations with Smurfit, Ames, and various power plant developers such as Calpine.

DPC began the development of the renewable resource resolution that was prepared for the city council approval. DPC is developing the firs-ever resource adequacy study and the evaluation of the adequacy of the extensive hydro system that delivers power to customers.

Ronald E. Davis

POSITION: Principal Consultant

EDUCATION: Milwaukee School of Engineering
Milwaukee, Wisconsin
B. S. Electrical Engineering, 1970

WORK EXPERIENCE:

BEW Engineering
Principal Consultant 7/08 - Present

Ron Davis just joined BEW Engineering in July 2008. Ron will continue to be responsible for providing consulting support services and serving as project manager on projects.

Davis Power Consultants 12/89-7/08
Principal Consultant

Ron has spent the previous nineteen years providing utilities, state agencies and renewable energy developers with a variety of services ranging from short-term and long-term resource planning; operations planning; power flow analysis; renewable energy evaluations; rate case and utility budget preparations; and power purchase RFP solicitations, bidding and evaluations. Ron has worked with the California Energy Commission on developing methodologies for evaluating the locational value of strategically locating renewable resources at locations that provide transmission grid reliability. This analysis included the analysis of residential PV. Ron has also worked via Itron for the California Public Utility Commission on the historical transmission value of self-generation.

Henwood Energy Services 7/82 – 11/89
Energy Control and Consultants
Entec Consulting
Vice-President of Marketing

Ron was in charge of marketing the production costing models developed by the different consulting firms. Ron also completed short-term and long-term resource planning studies and software training to utilities throughout the U.S., Canada and Europe.

San Diego Gas and Electric 7/70 – 6/82
Central Illinois Light
Commonwealth Edison

Various engineering positions

For SDG&E and CILCO, Ron worked in the resource planning department conducting various studies on long-term resource acquisitions. For COMED, Ron worked in the distribution engineering and distribution planning; and operational analysis department.

PROJECT EXPERIENCE:

The following reports highlight the expertise that Ron has on renewable energy evaluations.

CPUC Self-Generation Incentive Program: Sixth Year Impact Evaluation Final Report. August 30, 2007.

CPUC Self-Generation Incentive Program: 2005 Impacts Evaluation Research Plan. July 2007.

CPUC Self-Generation Incentive Program: Fifth Year Impact Evaluation Report. March 1, 2007.

CPUC Self-Generation Incentive Program: Solar PV Costs and Incentive Factors: Final Report. February 2007.

Intermittency Analysis Project; Final Report, California Energy Commission, July 2007, CEC-500-2007-081

Intermittency Analysis Project: Appendix A, Intermittency Impacts of Wind and Solar Resources on Transmission Reliability, California Energy Commission, July 2007, CEC-500-2007-081

Strategic Value Analysis for Integrating Renewable Technologies in Meeting Target Renewable Penetration, California Energy Commission, June 2005, CEC-500-2005-106

Renewable Energy and Electric Transmission Strategic Integration and Planning, Interstate Generation and Delivery of Renewable Resources into California from the Western Energy Coordinating Council States, California Energy Commission, April 2005, CEC-500-2005-064-D

Ron is also currently working on the Northern California Regional Integration of Renewable Study and the Locational Value Study of Combined Heat and Power

Resources.

SKILLS: Ron is knowledgeable in using most of the available production costing models and power simulation models.

Michael R. Behnke, P.E.

Expertise

- Utility and industrial electric power system analysis and design
- Power electronics applications and design
- Distributed generation utility interconnection issues
- Program and project management

Experience

2003 – Present: Behnke, Erdman, and Whitaker Engineering, Inc., San Ramon, CA

Co-Founder, Principal Engineer

- Founding partner of engineering firm providing consulting services to technology developers, systems integrators and electric utilities in the areas of distributed power generation, power electronics and mass transit.
- Perform transmission system integration studies for wind power plants using PSS/E, PSLF and ASPEN modeling tools, including development of user defined dynamic models for wind turbines on each platform.
- Design and model control systems for grid connected wind turbine applications.
- Develop and implement test plans for advanced wind turbine drive systems.
- Analyze codes and standards compliance of wind and solar power systems and components, with emphasis on power electronics.

2001 – 2003: Xantrex Technology, Livermore, CA

Vice President, Industrial & Utility Business

- Overall responsibility for company's $25M industrial and utility power electronics business, including sales, marketing, engineering, and customer service.
- Directed 20 engineers, technicians and account managers.

1999 – 2001: Trace International, Barcelona, Spain

General Manager

- Founded Trace's European sales and service facility.
- Hired, trained, and supervised technicians and account managers responsible for all sales and customer service of company's products throughout Europe.

1997 – 1999: Trace Technologies, Livermore, CA

Vice President, Sales & Marketing

- Managed sales, marketing, application engineering and project management functions for $15.0M+ electronics company producing power conversion equipment for renewable energy, energy efficiency and power quality applications.
- Supervised four project engineers, one electrical designer, one sales engineer, and one marketing coordinator.

1996 - 1997: Los Medanos College, Pittsburg, CA

Engineering Instructor

- Taught introductory electric circuit analysis course to community college students transferring to four-year engineering programs.

1992 - 1997: Kenetech Windpower, Livermore, CA

Manager, Power Systems

- Managed product development teams for new power electronics based products for the electric utility industry, including adjustable speed drives, photovoltaic inverters, and battery energy storage converters.
- Developed technical and business proposals for advanced utility energy storage and production systems, and for power electronics based products for utility and industrial applications.
- Provided application engineering function for wind energy systems, serving as primary contact between utility engineering departments and internal engineering and manufacturing organizations.

Senior Electrical Engineer

- Designed power distribution systems for wind energy plants, including low and medium voltage electrical systems.
- Provided technical support to operations and maintenance groups on high voltage systems.

1986 - 1992: Pacific Gas & Electric, San Francisco, CA

System Protection Engineer

- Applied, coordinated, set and analyzed the operation of protective relaying and automatic control systems for bulk power transmission and generation facilities.
- Provided technical guidance to field technicians in the proper installation, testing and troubleshooting of protective relaying systems.
- Assisted in the development of design standards and test procedures for new solid-state and microprocessor-based protective relays.

Substation Engineer

- Performed project cost estimating, conceptual design, equipment specification, supplier document review for substation expansions and upgrades.
- Directed design drafting personnel in the production of construction drawings.

Education

- MS Electrical Engineering - Santa Clara University, 1993
- BS Electrical Engineering - Purdue University, 1986

Professional Affiliations

- Registered Professional Engineer, State of California (E-13343)
- National Council of Examiners for Engineering and Surveying
  - Member, Electrical Examination Committee, 1990 - Present
  - Chair, Electrical Power Depth Exam Development Committee, 2006 – Present
- Institute of Electrical and Electronics Engineers (IEEE)
  - Power Engineering, Industry Applications, and Power Electronics Societies
  - Region 6 Central Area Chairman, 1997-1999
  - San Francisco Bay Area Council
    - Finance Chairman, 1993-1994
    - Section Director,1992-1993
  - Oakland - East Bay Section
    - Section Chairman, 1991-1992
    - Section Officer, 1989-1992
    - Power Engineering Society Chapter Officer, 1987-1990
  - Member, IEEE Working Group P929, ANSI/IEEE Standard 929, "IEEE Recommended Practice for Utility Interface of Residential and Intermediate Photovoltaic (PV) Systems"
  - Member, IEEE Working Group P1547, "Standard for Interconnection of Distributed Resources to the Area Electric Power System"
- IEC Technical Committee 88, Wind Turbine Systems
  - Member, US Technical Advisory Group, 1999 – Present
  - Member, TC88 Working Group 21, "Measurement and Assessment of Power Quality Characteristics of Grid Connected Wind Turbines", 2003 – Present
- Electricity Storage Association
  - Board of Directors Member and Secretary, 1999 – 2001
- Solar Electric Power Association
  - Board of Directors Member, 2006 – Present
- Reviewer, Institution of Engineering and Technology (IET) Renewable Power Generation Journal, 2007 - Present
- Member, Eta Kappa Nu

Recent Publications

- "Reactive Power Planning for Wind Power Plant Interconnections", 2008 IEEE Power Engineering Society General Meeting, 20-24 July 2008.
- "Development and Validation of WECC Variable Speed Wind Turbine Dynamic Models for Grid Integration Studies", NREL Conference Report, NREL/CR-500-40581, September 2007.
- "Impact of Past, Present and Future Wind Turbine Technologies on Transmission System Operation and Performance", California Energy Commission, Report Number CEC-500-2006-050, May 2006.
- "Dynamic Model for a Variable Speed Wind Turbine Generator with Synchronous Machine and Full Power Conversion Topology", International Conference on Future

Power Systems, Amsterdam, Netherlands, November 2005.

- "The Application of Medium-Voltage Electrical Apparatus to the Class of Variable Speed Multi-Megawatt Low Wind Speed Turbines", NREL Subcontractor Report, NREL/SR-560-3868, November 2005.
- "Secondary Network Distribution Systems Background and Issues Related to the Interconnection of Distributed Resources", NREL Technical Report, NREL/TR-560-38079, July 2005.
- "Recent Application and Performance of Large, Grid-Connected Commercial PV Systems", 29th IEEE Photovoltaic Specialists Conference, 19-24 May 2002.
- "Design Considerations for Three-Phase Grid Connected Photovoltaic Inverters", 29th IEEE Photovoltaic Specialists Conference, 19-24 May 2002.
- "The Static Power Converter as the Network Interconnection Package for Distributed Generation and Storage Systems", IEEE/PES Transmission and Distribution Conference and Exposition, 28 Oct.-2 Nov. 2001.
- "Development of a Modular, Multimode Battery Energy Storage System for Power Quality and Energy Management Applications", Electrical Energy Storage Systems Applications and Technologies, 1998 International Conference, June 16-18, 1998.
- "Development and Testing of a 1.7 MVA Superconducting Magnetic Energy Storage Based Sag Protector", Electrical Energy Storage Systems Applications and Technologies, 1998 International Conference, June 16-18, 1998.
- "A Three-Phase Synchronous Frame Controller for Unbalanced Load (Inverter Operation)", 29th Annual IEEE Power Electronics Specialists Conference, 1998.

BILLY QUACH

POSITION Consultant

EDUCATION

[redacted]

School of Engineering **MBA & MSE: Business Administration and Systems Engineering**
Expected Graduation Date: October 2008

[redacted]

School of Engineering **Bachelor of Science in Electrical Engineering**
Graduation Date: June 2003

WORK EXPERIENCE

BEW Engineering 7/08 - Present
Consultant
Completing the same work as with DPC.

Davis Power Consultants, San Jose, CA 7/03 – 7/08
Consultant
Actively involved in transmission power flow and production cost analysis for various projects.

PROJECT EXPERIENCE

Silicon Valley Power, Santa Clara, CA 7/03 – Present

Ran computer model of the City's production cost model of resources. Composed extensive report on prospective wind development opportunities to be considered by the City. Played integral part in setting up on-going study for the City of Santa Clara's operating alternatives. Assisted in development of resource adequacy analysis.

California Energy Commission, Sacramento, CA 9/03 – Present

Ran PowerWorld simulator to analyze transmission power flow scenarios for 2005 Strategic Value Analysis renewable study. Introductory knowledge in various aspects of renewable technologies. Assisted in training of CEC staff in collaboration of PowerWorld Corporation in simulator software.
Future projects deal with transmission analysis on intermittency study of

renewable resources and transmission analysis issues and opportunities in other renewable development.

City of Shasta Lake, Shasta Lake, CA 6/05 – Present

In process of training to work on City's Distribution Model Software. Assisted in several economical analyses of City's rate model and distribution planning. In charge of creating monthly billing statements for City's large industrial customer.

SKILLS

Current Software Tools: PowerWorld Simulator, PPLUS Production Cost Model, PI, SynerGEE Electric
Windows (All Versions), Mac OS X, HTML, MS Office, Proficient in Multimedia Applications, Email Applications, PC Software/Hardware Experience, MatLab, PSpice, AutoCAD, IronCAD, and Mentor Graphics

LANGUAGES

Fluent in English, Vietnamese and elementary Japanese

Neelofar Anjum

Expertise

- Power system analysis
- Power system SCADA and EMS specification and design

Experience

2008 – Present: BEW Engineering, Inc., San Ramon, California

Power Systems Engineer

- Perform transmission system integration studies (power flow and transient stability) for wind and solar power plants using PSS/E, PSLF and ASPEN modeling tools.

2007 – 2008: Jacobs Engineering Group, Inc., San Francisco, California

Electrical Engineer

- Quality control and assurance of substation construction, testing and commissioning for light rail project in San Francisco.

2002 – 2007: Power Grid Corporation of India Ltd., New Delhi, India

Engineer

- Wrote, designed and produced functional design specifications for substation automation, energy accounting & billing systems.
- Conceptual and detailed engineering of SCADA, EMS, DMS, and communication networks for EHV transmission system. Included design, sourcing, installation, testing and commissioning of hardware, software, documentation, training, and support services.
- Conceptual and detailed design of electrical substation drawings including one-lines, schematics, elementary, wiring diagrams, layouts, and SCADA point lists.
- Analyzed equipment and power system operational performance including feasibility studies, reliability and risk analyses.
- Coordinated construction, operation and maintenance of electric power transmission lines and distribution systems and equipment.

Education

- Bachelor's Degree in Electronics and Telecommunication Engineering, Hitkarini College of Engineering and Technology, Jabalpur, India, 2001